

# (12) UK Patent Application (19) GB (11) 2 360 994 (13) A

(43) Date of A Publication 10.10.2001

(21) Application No 0004164.0

(22) Date of Filing 22.02.2000

(71) Applicant(s)  
**Stannah Stairlifts Limited**  
(Incorporated in the United Kingdom)  
Watt Close, East Portway, ANDOVER, Hampshire,  
SP10 3SD, United Kingdom

(72) Inventor(s)  
**Kenneth John Steel**  
**Ian Trevor Dampney**

(74) Agent and/or Address for Service  
**IPCA Consulting Limited**  
Parallel House, 32 London Road, GUILDFORD, Surrey,  
GU1 2AB, United Kingdom

(51) INT CL<sup>7</sup>  
**B66B 9/08**

(52) UK CL (Edition S )  
**B8L L24**  
**B7L LT**

(56) Documents Cited  
**WO 97/26207 A1** **WO 00/78661 A1**

(58) Field of Search  
UK CL (Edition S ) **B8L LB LCA**  
INT CL<sup>7</sup> **B66B 9/08**  
Online: WPI, EPODOC, JAPIO.

(54) Abstract Title  
**Stairlift having variable length rail**

(57) A stairlift is provided having a rail 13, 14 formed in two axially aligned parts 11, 12, one part being axially displaceable with respect to the other 18. A carriage 7 is driven along the rail 13, 14 in the conventional manner. However, when the carriage is in position on the moveable rail part 12, operation of the carriage drive mechanism causes the moveable rail part 12 to be displaced with respect to the fixed rail part 11.

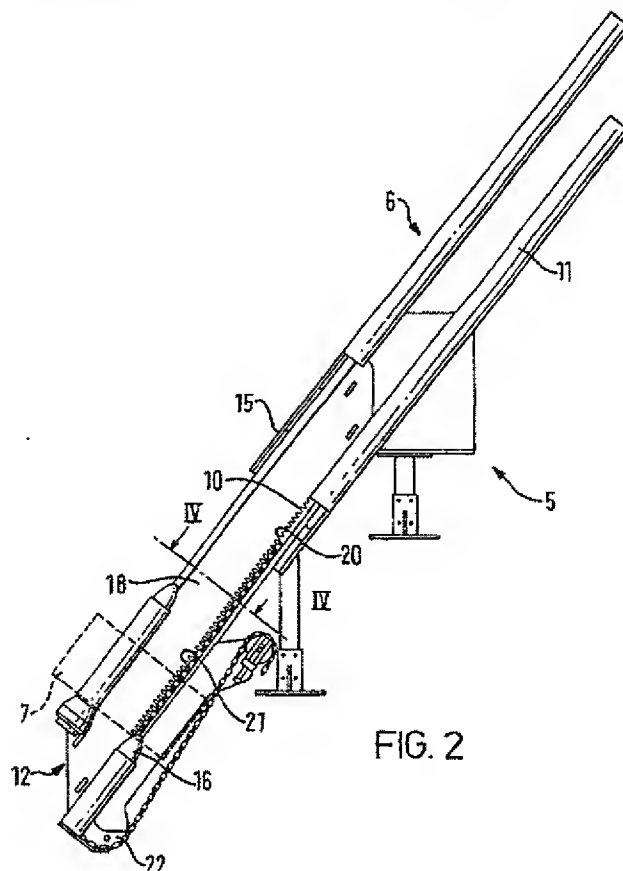
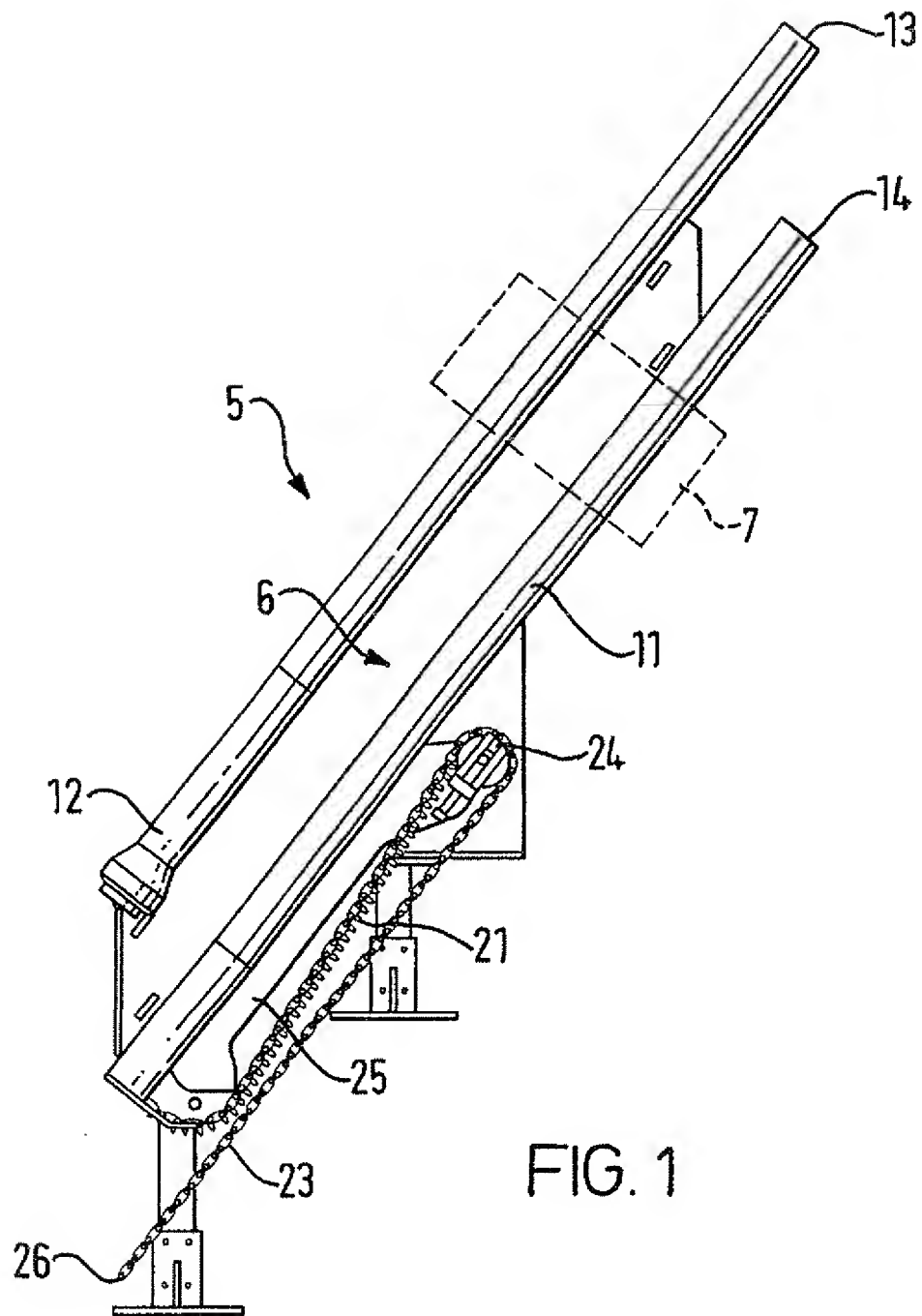


FIG. 2



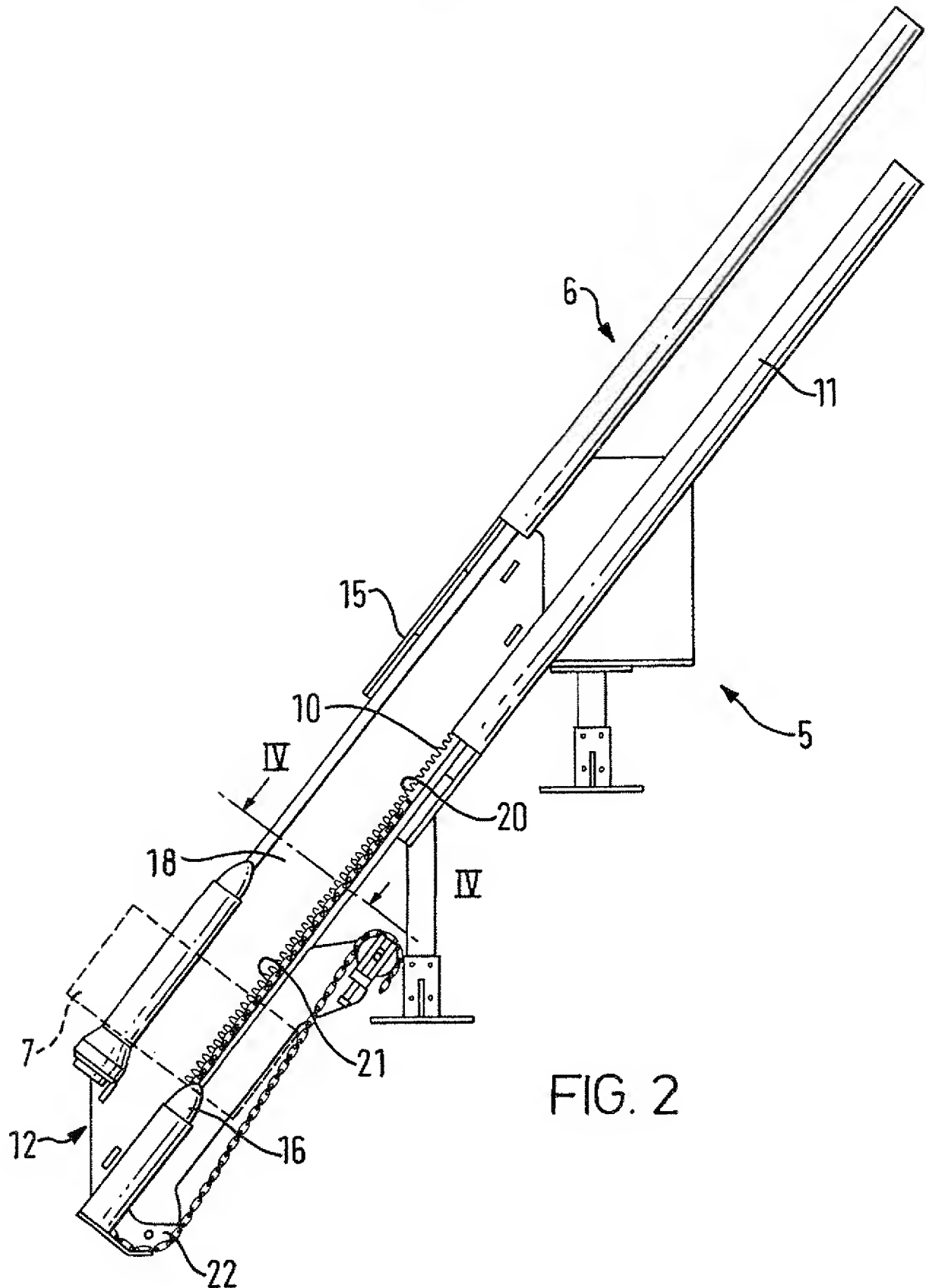
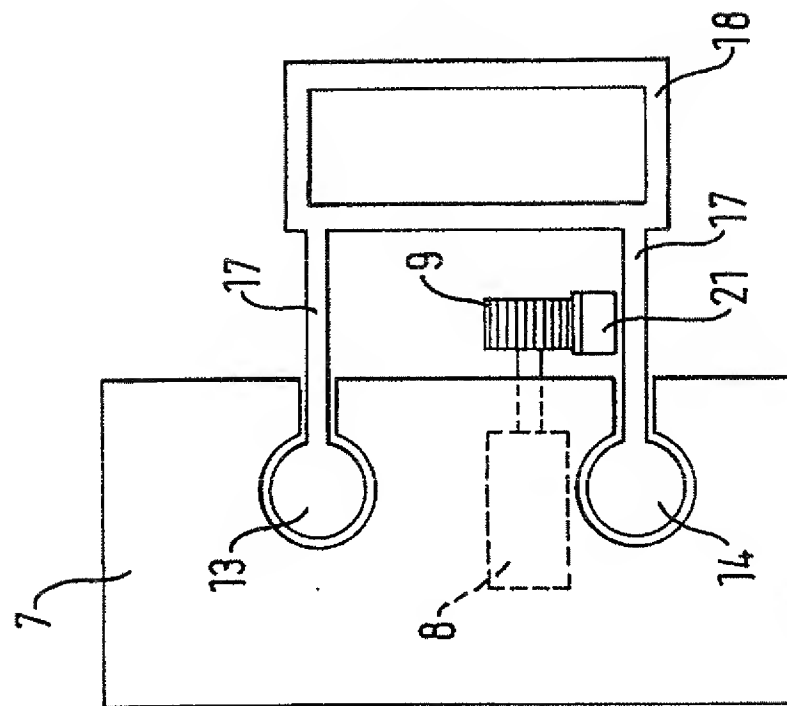
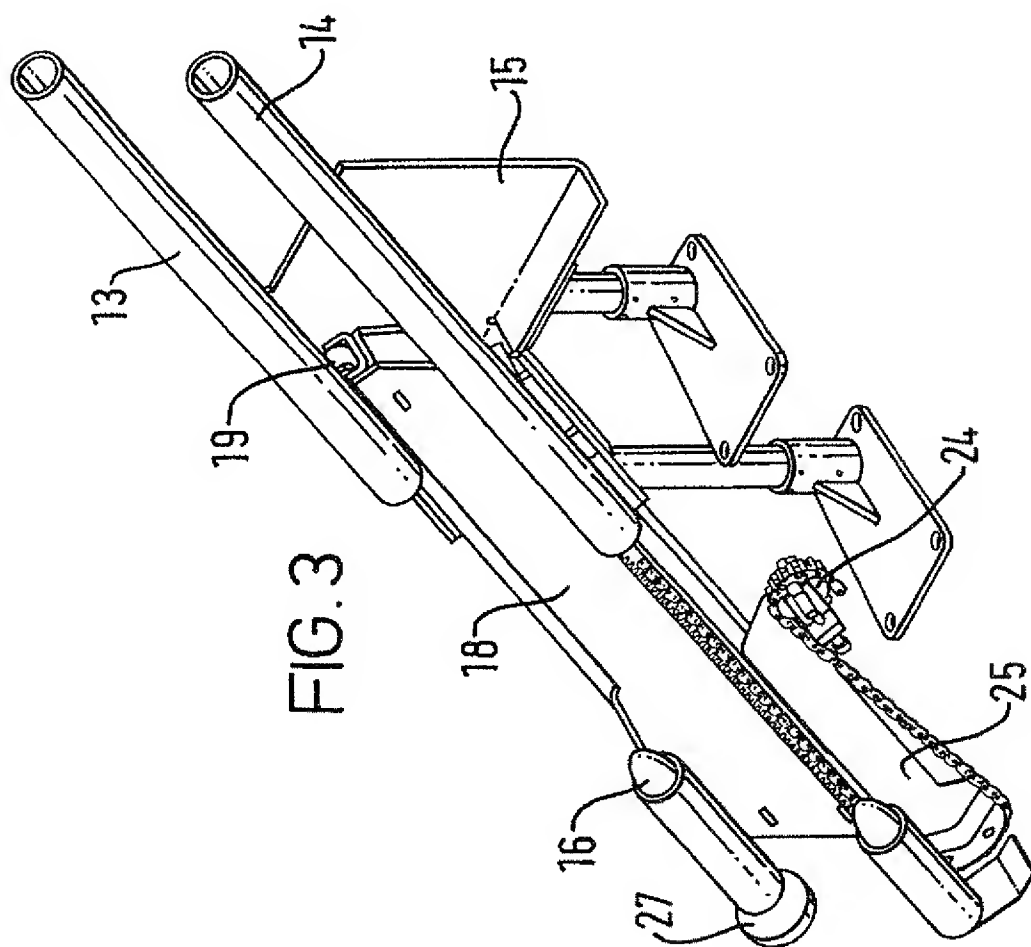


FIG. 2



## IMPROVEMENTS IN OR RELATING TO STAIRLIFTS

### *Field of the Invention*

This invention relates to stairlifts and, in particular, to a stairlift having a rail which can be varied in effective length to provide additional clearance or room at the lower end of a stairlift installation when the stairlift is not in use.

### *Background*

In certain stairlift installations, one or both ends of the stairlift rail are moveable with respect to the main rail section to provide additional clearance or room, particularly about doorways or passageways, when the stairlift is not in use. Currently the most common way of providing this movement is to hinge an end section of the rail to the main rail so that the end can be pivoted into a stowed position out of alignment with the main rail section. One alternative to this is shown in International Patent Application WO 97/26207. This patent application describes a stairlift rail having a moveable end section mounted in a guide, which guide allows the moveable end section to be moved into a position offset from axial alignment with the main rail section, and then to be displaced into a stowed position beneath the main rail section, thus reducing the effective rail length when the stairlift is not in use.

In all known prior art forms of stairlift which incorporate a moveable rail-end section, the moveable rail end must be moved, in a discrete operation, between the stowed position and that in which it is aligned with the main rail section, so as to provide a functioning extension of

the main rail section. This necessitates the incorporation of controls to ensure the carriage is unable to be displaced off the end of the rail whilst the moveable end is in the stowed position, and often a separate drive motor and transmission are provided to displace the end section between its stowed and operating positions. Finally the hardware necessary to provide the moving and stowing functions described above tends to be bulky and somewhat unsightly.

It is an object of this invention to provide a stairlift which addresses the afore mentioned problems in a novel and effective manner, or which will at least provide a useful choice.

### *Summary of the Invention*

Accordingly, in one aspect, the invention provides a stairlift having a rail which includes a fixed rail part, and a moveable rail part displaceable with respect to said fixed rail part;

a carriage moveable along said rail; and

drive means to drive said carriage along said rail,

said stairlift being characterised in that said drive means is further operable to displace said moveable rail part with respect to said fixed rail part.

In a second aspect, the invention provides a stairlift having a rail which includes a fixed rail part, and a moveable rail part displaceable with respect to said fixed rail part;

a carriage moveable along said rail; and

drive means to drive said carriage along said rail,

said stairlift being configured and characterised such that said carriage may be displaced by said drive means from said fixed rail part onto said moveable rail part, further operation of said drive means whilst said carriage is on said moveable rail part then displacing said moveable rail part with respect to said fixed rail part.

Preferably said rail is defined by one or more tubular sections of substantially uniform cross-section. More preferably said rail is defined by two tubular sections.

Preferably said moveable rail part is axially displaceable with respect to said fixed rail part.

Preferably said moveable rail part is supported in a fixed bracket, said bracket being constructed and arranged to maintain alignment of said moveable rail part with respect to said fixed rail part, yet permit said moveable rail part to move axially with respect to said fixed rail part.

Preferably said drive means includes a rigid drive section and a flexible drive section, said rigid and flexible sections being engageable by a common driving member mounted on said carriage.

Preferably said rigid drive section comprises a gear rack and said flexible drive section comprises gear teeth mounted on a chain.

Preferably said common driving member comprises a drive pinion.

In a third aspect, the invention provides a method of providing a stairlift installation having a rail of variable length, said method including the steps of providing a rail having a fixed rail part, and a moveable rail part displaceable with respect to said fixed rail part;

mounting a carriage for movement along said rail; and

providing drive means to displace said carriage along said rail,

said method being characterised in that said drive means is constructed and arranged to displace said moveable rail part with respect to said fixed rail part as said drive means is operated with said carriage in position on said moveable rail part.

Many variations in the way the invention may be performed will present themselves to those skilled in the art upon reading the following description. The description which follows should not be regarded as limiting but rather, as an illustration only of one manner of performing the invention. Where possible any element or component should be taken as including any or all equivalents thereof whether or not specifically mentioned. The scope of the invention should be determined solely by the appended claims.

#### *Brief Description of the Drawings*

One form of stairlift incorporating the invention will now be described with reference to the accompanying drawings in which:

Figure 1: shows a side elevational view of a stairlift according to the invention in a stowed configuration;



Figure 2: shows a side elevational view of the stairlift of Figure 1 in an extended fully functional configuration;

Figure 3: shows an isometric view of parts of the stairlift when in the general configuration shown in Figure 2; and

Figure 4: shows a schematic view along the line IV- IV in Figure 2.

#### *Description of Working Embodiments*

Referring to the drawings, the invention provides a stairlift installation 5 having a rail 6 and a carriage 7, indicated in dotted outline, which moves back and forth along the rail 6 in the conventional manner. Also, as is conventional, the carriage and rail include drive means to enable the carriage to be driven along the rail. In the particular embodiment herein described, the drive means includes a motor and gearbox 8 (Figure 4) on the output of which is mounted a drive sprocket 9. The drive sprocket engages a further element of the drive means, namely a drive rack 10 which is described in greater detail below.

The above describes a conventional stairlift arrangement. The essence of invention in the present case resides in the fact that rail 6 is provided in two parts, a fixed rail part 11 and a rail part 12 which is moveable with respect to the fixed part 11. The configuration of the rail parts 11 and 12 is such that movement of the part 12 with respect to the part 11 is effected by displacement of the carriage 7 on the moveable part 12.

As shown in the drawings, the moveable rail part 12 is, and remains,

axially aligned with the fixed rail part 11 and each comprises an upper tube 13 and a lower tube 14. The moveable rail part 12 is slidably supported in a bracket 15 which serves to maintain axial alignment of the rail parts 11 and 12 at all times yet allow the moveable rail part 12 to move into the position shown in Figure 2 and 3 wherein the effective length of the rail 6 is extended. Those end sections of the tubes 13 and 14 of the moveable rail section 12 preferably include domed engaging sections 16 to assist and support the alignment of the rail sections 11 and 12 when in the closed or stowed configuration shown in Figure 1.

As can be seen in Figure 4, the tubular sections comprising the moveable rail part 12 are supported on arms 17 extending from a chassis 18, the chassis 18 being slidably received in bracket 15 via rollers, one of which is indicated by 19 in Figure 3.

The drive rack 10 comprises a conventional rigid rack 20 where fixed to the rail part 11 and extending a short distance beyond as can be seen in Figure 2. Extending from the lower end of the rigid rack 20 is a flexible rack section 21 defined by a series of rack teeth interconnected by chain links. This arrangement allows the rack section 21 to be supported by, and to pass around, chain guide 22 mounted on the lower end of chassis 18. A length 23 of conventional chain is then provided to maintain the flexible rack 21 under a degree of tension. To this end the chain 23 passes about idler sprocket 24 mounted on carrier arm 25 which, as shown, extends in a forward direction on the underside of chassis 18. The free end 26 of the chain 23 is fixed to a datum, for example a bracket (not shown) mounted on a lower tread of the staircase.

The operation of the stairlift as above described is as follows:

With the stairlift in the configuration shown in Figure 1, the rail 6 is in its shortest or stowed configuration and the carriage 7 is in position on the fixed rail section 11 someway up the staircase.

To move the carriage down to its lowermost position, so that a user can mount or dismount a chair (not shown) mounted on the carriage, the drive mechanism is operated so as to move the carriage 7 down the rail. As the carriage is displaced onto and down the moveable rail part 12, the carriage chassis engages end stop 27 provided on the lower extremity of upper tube section 13. By this stage drive pinion 9 is in engagement with flexible rack section 21 which is held up in contact with the drive pinion by the lower of arms 17 attached to chassis 18. As the carriage is then prevented from further movement with respect to the rail part 12, the drive pinion applies tension to the rack part 21. This has the effect of drawing the rack part 21 about guide 22, rotating the sprocket 24, and causing the chassis 18 to slide downwardly in support bracket 15. This downward sliding movement can continue until the sprocket 24 reaches the lower fixing point of the chain 23 or until space limitations prevent the rail part 12 extending any further. The user may then mount or dismount the stairlift and thereafter operate the controls in the conventional manner to move up the staircase. As the carriage moves up and again onto the fixed rail part 11, the moveable rail part 12 may be brought back into close engagement with the fixed rail part 11, as shown in Figure 1, by operation of a counterweight system (not shown) or any other suitable return mechanism including latching to the upwardly moving carriage.

It will thus be appreciated that the present invention, at least as in the case of the particular embodiment herein described, provides a simple yet effective means of varying the rail length and thus

providing clearance at the rail ends when the lift is not in operation. This is achieved without the need for complicated hinge mechanisms or separate hinge controls.

### Claims

- 1) A stairlift having a rail which includes a fixed rail part, and a moveable rail part displaceable with respect to said fixed rail part;  
  
a carriage moveable along said rail; and  
  
drive means to drive said carriage along said rail,  
  
said stairlift being characterised in that said drive means is further operable to displace said moveable rail part with respect to said fixed rail part.
- 2) A stairlift having a rail which includes a fixed rail part, and a moveable rail part displaceable with respect to said fixed rail part;  
  
a carriage moveable along said rail; and  
  
drive means to drive said carriage along said rail,  
  
said stairlift being configured and characterised such that said carriage may be displaced by said drive means from said fixed rail part onto said moveable rail part, further operation of said drive means whilst said carriage is on said moveable rail part then displacing said moveable rail part with respect to said fixed rail part.
- 3) A stairlift as claimed in claim 1 or claim 2 wherein said rail is defined by one or more tubular sections of substantially uniform cross-section.

- 4) A stairlift as claimed in claim 3 wherein said rail is defined by two tubular sections.
- 5) A stairlift as claimed in any one of claims 1 to 4 wherein said moveable rail part is axially displaceable with respect to said fixed rail part.
- 6) A stairlift as claimed in claim 5 wherein said moveable rail part is supported in a fixed bracket, said bracket being constructed and arranged to maintain alignment of said moveable rail part with respect to said fixed rail part, yet permit said moveable rail part to move axially with respect to said fixed rail part.
- 7) A stairlift as claimed in any one of the preceding claims wherein said drive means includes a rigid drive section and a flexible drive section, said rigid and flexible sections being engageable by a common driving member mounted on said carriage.
- 8) A stairlift as claimed in claim 7 wherein said rigid drive section comprises a gear rack and said flexible drive section comprises gear teeth mounted on a chain.
- 9) A stairlift as claimed in claim 7 or claim 8 wherein said common driving member comprises a drive pinion.
- 10) A method of providing a stairlift installation having a rail of variable length, said method including the steps of providing a rail having a fixed rail part, and a moveable rail part displaceable with respect to said fixed rail part;  
  
mounting a carriage for movement along said rail; and

providing drive means to displace said carriage along said rail,

said method being characterised in that said drive means is constructed and arranged to displace said moveable rail part with respect to said fixed rail part as said drive means is operated with said carriage in position on said moveable rail part.

- 11) A stairlift when constructed arranged and operable substantially as described herein with reference to and as illustrated in the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0004164.0  
Claims searched: 1-11

Examiner: Paul Marshall  
Date of search: 2 August 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): B8L (LB, LCA)

Int Cl (Ed.7): B66B 9/08

Other: Online: EPODOC, WPI, JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	WO 00/78661 (Soderholm, Sven) See figures.	-
A	WO 97/26207 (Ooms, Otto ) See figures for extending rail section.	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.